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Memory effects from symmetries for a vacuum gravitational plane wave

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Memory effects are persistent modifications of relatives observables (relative distance, relative velocity, etc ...) between test particles induced by the passage of a gravitational wave. These radiative effects stand as ones of the last predications of general relativity yet to be confirmed. On the one hand, modeling these memory effects is crucial for developing accurate waveform templates to be confronted with future observation. On the other hand, these radiatives effects are intimately related to the asymptotic symmetries of asymptotically flat spacetimes, thus revealing the fine structure of the infrared regime of gravity. In this talk, I will discuss the realization of memory effects in a non-asymptotically flat spacetime which corresponds to a pp-wave. I will review the recent classification of the different memory effects (displacement, velocity, etc...) induced by this simple exact non-linear radiative solution of GR. I will also review key theorems relating these memories to the explicit and hidden symmetries (associated to Killing tensors) of the spacetime geometry. This will provide a pedagogical example where memories can be treated fully analytically, the methods discussed here being applicable beyond this framework. This talk is based on the recent published article: https://inspirehep.net/literature/2796995

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